

## Carbon nanotubes/pectin/minerals substituted apatite nanocomposite depositions on anodized titanium for hard tissue implant: in vivo biological performance

### ABSTRACT

A surface deposition approach enveloping the use of biocompatible trace components and strengthening materials will affect the physicochemical and osseointegration properties of nanocomposite deposited implants. The current work is aimed at the development of functionalized carbon nanotubes (f-CNT)/Pectin (P)/mineralized hydroxyapatite (M-HA) ((f-CNT/P/M-HA)) nanocomposite depositions by electrophoretic deposition on anodized titanium (TiO<sub>2</sub>) implant. The capacity of f-CNT manages the cost of mechanical strength, while pectin (extracted from pomegranate peel) and minerals (strontium, magnesium, and zinc) enhance the biocompatibility of the HA deposition was investigate utilizing different methods. The functional and morphological analyses were done by FTIR, XRD, XPS, SEM-EDX and TEM. The mechanical depiction results show improved adherence quality for the nanocomposite deposition. Additionally, an enhanced viability of osteoblast cells (MG63 (HOS)) was monitored in vitro on the f-CNT/P/M-HA nanocomposite deposition. The capacity of the nanocomposite deposited TiO<sub>2</sub> implant to encourage bone development was assessed in vivo. Hence, the as-synthesized nanocomposite deposited TiO<sub>2</sub> that joins the comfort osteoconductivity of mineralized hydroxyapatite, pectin collectively with the compressive strength of f-CNT can have numerous uses in orthopaedics since it could enhance implant fixation in human bone.

**Keyword:** Bone; Carbon nanotube; Nanocomposite; Pectin; Osteogenic ability